

# Sustainability in the Supply Chain: Conditions and Mechanisms for Waste Management in Medium-Sized Retail Supermarkets

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Environmental knowledge, Market orientation,  
Value generation.

**Abstract—** In view of legal and social requirements, sustainability became the core of the actions and actions of associations in adopting policies to reduce environmental damage with benefits to society. This study aims to analyze the relationship between waste management practices and the generation of value in medium-sized retail supermarkets. A research is justified by the researchers' emphasis on large retailers or small chains and is based on three hypotheses focused on management practices and value generation, environmental knowledge and market orientation. This is a survey, applied to a sample of 234 employees from two retail chains, from June to October 2021, analyzed using Structural Equation Modeling (SEM), characterized as a quantitative descriptive research. The results show that subjective environmental knowledge and market orientation moderate the relationship between waste and waste management practices and the generation of value in the production chain and that the more effective, the greater the generation of value.

## I. INTRODUCTION

The convergence between multiple environmental problems of global reach and adverse consequences for humanity has driven a broad debate on the measures to be taken by society to face these challenges. An important milestone in this process was the publication of the report "Our Common Future" by the United Nations World Commission on Environment and Development in 1987. Since then, the notion of sustainable development based on three interconnected pillars has been established: environmentally correct, economically viable and socially fair.

The role played by companies and the environmental and social implications of their business models appear,

therefore, as key elements within this set of efforts. Sustainability is now at the heart of the strategies and actions of a growing number of companies that progressively change their policies to reduce the damage caused by their activities and bring benefits to the community and the planet. As a result, organizations increasingly incorporate attributes and practices that allow them to present themselves as sustainable and/or green (Kumar, Manrai, & Manrai, 2017).

This more ostensible and assertive position of organizations in favor of sustainability is accompanied by increased levels of demand from legislation and consumers. In this way, organizations need to go beyond listening to and meeting the purposes of these different stakeholders, but it is also appropriate to simultaneously

integrate these actors into the decision-making process of companies to allow the formulation of increasingly coherent and integrated plans and strategies, as well as enabling the anticipation of trends and accurate prospection of future scenarios (Hannon, Foxon, & Gale, 2015).

Overall, there is an emphasis of research on these issues in terms of prioritizing two extremes: large multinational retailers or small niche supermarket chains (Colla, 2018; Sparks, 2018). In the first case, there are references to broad projects aimed at the sustainability of networks such as Walmart, Tesco and Marks and Spencer, (Vadakkappatt et al., 2020; Goebel et al., 2018). As for the latter, case studies on alternative initiatives in the face of large “commoditized” networks predominate, highlighting attributes such as fair trade, community well-being and short production-commercialization-consumption circuits (Sparks, 2018).

There is, therefore, a gap with regard to the waste management by medium-sized supermarkets. With this as a background, this study aims to analyze the waste management practices of retailers and their relationship with value generation and with the moderating variables worked in the conceptual model (Reade, 2017; Reinartz, Wiegand, & Imschloss, 2019; Çankaya, & Sezen, 2018).

It is identified as opportune to analyze the relationship between waste management practices and the generation of value in the context of supermarkets. The central point is translated into an effort to advance on the following question: what are the interrelationships between waste management practices in value generation and sustainability performance in the context of retail supermarkets and their value chain?

In order to pursue an answer to this problem, this study aims to analyze the relationships between waste management practices and value generation in the context of medium-sized retail supermarkets in the Federal District, having as object of analysis two supermarket chains. In this sense, two main research fronts were identified that focus on retail constraints and restrictions in the context of food systems: pre-consumption and post-consumption (Dorward, 2012; Chen et al., 2017).

The latter constitutes the predominant focus of this study, aimed at analyzing these conditions and restrictions in a network of medium-sized supermarkets in the Federal District, a region that leads the economic and human development rankings, despite center-periphery disparities such as it happens in several other major cities.

Little is known about the relationship between environmental knowledge and market orientation with

sustainable management practices and value creation, as they are actions to ensure high business performance. To fill this research gap, this study analyzes a data set of 234 employees from two medium-sized supermarket chains in the Federal District, through Structural Equation Modeling (SEM), characterizing a quantitative and character research. descriptive.

In addition to this introductory section, the study elucidates four more sections. The next section deals with the development of hypotheses, contemplating aspects related to sustainability practices, the Stakeholders Theory, the sustainability and the retail value chain. The third section presents the methodological procedures outlined for the investigation; then, the analysis and discussion of the results obtained. Finally, the final considerations of the study are presented, with reflections for future research.

## II. DEVELOPMENT OF HYPOTHESES

### 2.1 Sustainability practices

The idea of sustainable development refers to the concept of sustainable society that emerged in the early 1970s (Dresner, 2008). According to Reid (1995), its incorporation into the political debate gained strength with the publication of the “Our Common Future” Report (also known as The Brundtland Report) in 1987, being one of the main consequences of the work of the United Nations World Commission on Environment and Development.

Despite representing a fundamental advance, the definition of sustainability contained in the Brundtland Report is relatively vague, reflecting to some extent the inherent complexity of sustainability (Mebratu, 1998). This conceptual imprecision, associated with its growing importance in the formulation of national and international public policies, has led to a broad debate that mixes different definitions and implications (Santillo, & Johnston, 2007).

It is generally recognized that sustainable development involves three aspects: economic, social and environmental aspects (Mills, & Elkington, 1999). To make the concept of sustainable development concrete, some international political agendas have been formulated and implemented in recent decades. Progressively, discussions and implementation agreements have become more extensive by giving greater weight to the pro-sustainability contributions of companies and civil society. Indeed, business organizations are seen as key actors in achieving positive social and environmental changes, while pursuing economic goals (Bebbington, & Unerman, 2018).

Over the past two decades, scholars have increasingly explored and created theoretical and empirical documents

to prove that economic freedom is related to many positive socioeconomic outcomes. Added to this, the implementation of these precepts has faced a series of obstacles since then. Examples of this are the lack of measurement standards and the low credibility of decentralized measurement standards developed by different agencies and countries. There are also conflicts regarding the application and accountability of funds transferred from developed countries to developing countries (United Nations, 2020; Mehta, & Siddique, 2018).

On the other hand, these gaps show a window of opportunity for companies to contribute even more significantly to governance schemes and dissemination of sustainable practices. This active engagement of companies in the wake of sustainable development goals will allow successful organizations to differentiate themselves from their competitors and create space for sustainable innovations in their business processes and stakeholder relationships (Van Zanten, & Van Tulder, 2018).

The adoption of sustainable practices by companies involves government regulation and standards that include parameters in waste management, use of natural resources, levels of pollution and energy efficiency (Kumar, Manrai, & Manrai, 2017). Furthermore, this process presupposes the effective participation of companies in the formulation and implementation of public policies for environmental management and labor relations, ensuring the minimization of various social and environmental impacts that represent a public problem insofar as they can impact the quality of life and the well-being of the entire community at the local, regional, national and global levels (Singh, & Giacosa, 2019). Thus, it is understood that socially responsible businesses involve acting “beyond the walls” of the organization, aiming to support collective health, development and well-being (Dost et al., 2019).

From this point of view, a watershed for the adoption or improvement of sustainable practices along value chains is made up of increasingly collaborative, concerted and transparent relationships (Vadakepatt et al., 2020). To this end, holistic and integrated solutions have gained strength in the format of partnerships with the most diverse upstream and downstream stakeholders in order to support the improvement of sustainable or “green” practices, products and processes (Rodríguez-García, Guijarro-García, & Carrilero-Castillo, 2019).

In this sense, the need for coordinated action between companies, suppliers and public and private stakeholders in facing socio-environmental challenges is highlighted (SINGH; Giacosa, 2019; Erez, 2019). In terms of

sustainability practices, this includes going beyond conventional practices and, above all, encompasses a proactive stance (Yanagi, & Michels-Kim, 2018). It is therefore necessary to find paths for business models based on a decidedly proactive sustainable organizational culture. In view of these approaches, it is pertinent to highlight the following hypothesis for this study:

*Hypothesis 1: H1- The more comprehensive and effective the waste management practices of retail supermarkets, the greater the generation of value.*

## 2.2 The Stakeholders Theory

The Stakeholders Theory comprises a broad set of principles that have been developed in recent decades since the publication of the book *Strategic Management: a stakeholder approach*, by Robert Freeman (2010), and that have been gaining more and more space in management literature and in important international journals (Miles, 2015). One of the main differentials of this theory is the incorporation of an approach centered on the firm, but which emphasizes the weight of interactions and relationships with agents (stakeholders) that somehow have an interest or connection with the company (Freeman, 2010).

This view, also called the Value Creation Stakeholders Theory, contrasts with other more specific and instrumental approaches such as the Managerial Stakeholder Theory (Hörisch, Schaltegeer, & Windolph, 2015; Khojastehpour, & Shams, 2020). In fact, the classic aspect of this theory assumes that stakeholders are not only the agents with a financial interest in the firm's performance, as suggested by the concept of business responsibility to shareholder, but encompasses what the literature consecrates as responsibility to all stakeholders (Colvin, Witt, & Lacey, 2020).

As a result, the Stakeholders Theory conceives an integration between ethics and business as equally fundamental dimensions to value generation activities that, in turn, lend meaning to the very existence of companies. There would be purposes that go beyond making profits (Hörisch, Schaltegeer, & Windolph, 2015; Harrison, Freeman, & Abreu, 2015). Therefore, this approach includes imperatives of a strategic and normative nature (Colvin, Witt, & Lacey, 2020) that point out ways to maximize the benefits provided by an organization to society, as well as maximize value for stakeholders (Khojastehpour, & Shams, 2020).

Thus, the Stakeholders Theory presents an analytical tool that contributes to the understanding of complex problems of a multidimensional and multisectoral nature (Khojastehpour, & Shams, 2020). It is on this path that the

last decades have witnessed the emergence of various initiatives and metrics on sustainable performance such as environmental seals and certifications such as ISO 14001 (Chowdhury et al., 2020). On another front, Stakeholders Theory has been articulated with different lenses and approaches. This is the case, for example, with Corporate Social Responsibility. (Khojastehpour, & Shams, 2020).

Regarding the thematic areas that amalgamate the Stakeholders Theory with discussions on sustainability, there are a myriad of issues covering from the externalities of the supply chain and the social impact of inadequate disposal to discussions on accountability and accountability in sectors such as finance and ecotourism (Saraiva et al., 2016; Geuke, Groh, & Muncke, 2018; Palombini, City, & Jacques, 2017; Wondirad, Tolkach, & King, 2020). Despite this wide dissemination, it is worth noting the recommendation by Hörisch, Schaltegeer and Windolph (2015) to circumvent an excessive inclusion of stakeholders and sustainability topics in favor of a carefully based selection of stakeholders and topics more relevant to the context of each organization.

Thus, it is evident that companies increasingly consider environmental preservation in their market strategies, so that pro-environmental attitudes, that is, in favor of the environment and sustainable development, are well regarded by employees, suppliers, consumers and all a network of interest. Therefore, considering and analyzing the Stakeholder Theory in the context of the company's sustainability becomes essential for its strengthening (Colvin, Witt, Lacey, & 2020; Hörisch, Schaltegeer, & Windolph, 2015; Harrison, Freeman, & Abreu, 2015; Khojastehpour, & Shams, 2020; Parmar et al., 2010).

However, there are many studies that address the Theory of Stakeholders, sustainability in general and sustainable practices in retail individually, that is, independent of each other (Chen et al., 2017; Geuke, Groh, e Muncke, 2018; Goebel et al., 2018; Kumar, Manrai, & Manrai, 2017; Papadas, Avllonitis, & Carrigan, 2018; Mehta, & Siddique, 2018; Van Zanten, & Van Tulder, 2018; Dost et al., 2019; Miles, 2015; Freeman, 2010; Hörisch, Schaltegeer, & Windolph, 2015; Khojastehpour, & Shams, 2020).

Thus, there is a gap on how the Stakeholders Theory can contribute to the understanding of the adoption of sustainable practices in retail. Thus, this study addresses the way that the Stakeholders Theory influences attitudes towards sustainability in food retail. From the perspective of the conceptual and empirical literature on sustainable environmental behavior and knowledge, another research hypothesis is shown:

*Hypothesis 2: H2 - The retailer's environmental knowledge moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) knowledge by the retailer will increase (decrease) the strength of relationship.*

### 2.3 Sustainability and retail value chain

The development of a sustainable organizational culture by retail companies is directly related to the willingness to solve problems of a socio-environmental nature whose solutions are in the common interest of the actors directly and indirectly involved with the activities of the company and the value chain that it integrates (Singh, & Giacosa, 2019). Such predisposition involves obtaining concrete and tangible gains for the company and also, to some extent, by the altruistic engagement of companies in collective efforts to promote alternative and sustainable production, marketing and consumption models (Geissdoerfer et al., 2017).

Paying attention to the strategic link performed by retailers within the scope of their value chains, the primordial character of the management of retail companies in the adoption of sustainable practices that help to facilitate the transition to more conscious and socio-environmentally responsible models is highlighted, being the postures and decisions of supermarket managers and retailers in general fundamental, which can promote rapid changes that impact the functioning of the entire retail chain (Liu et al., 2018). Thus, it is faced with the expansion of the focus and scope of sustainable practices with a view to the ideal of proactively sustainable companies, giving rise to the creation of a specific type of market-oriented competitive advantage (Abdul-Rashid et al., 2017).

In the specific case of supermarket retail, such assumptions tend to be even more acute due to their key role in the confluence between different stakeholders within the value chain, spreading upstream and downstream from the extraction and processing of natural resources to the management and reuse of waste, including the optimization of processes that save raw materials and mitigate waste. By highlighting the need for waste management that does not allow for the transfer of problems and responsibilities, Brazilian legislation in the area has been strengthened since the Federal Constitution of 1988 by advancing both in the propositional sense and in the punitive bias (Cruz, & Ferreira, 2018).

This process leads to the formulation of specific legislation for solid waste, embodied in Law 12,305, of August 2, 2010, which instituted the National Solid Waste Policy (Política Nacional de Resíduos Sólidos - PNRS). In



general terms, retail is defined as a wide range of activities related to the sale of goods and services for personal use, whose variety of formats and structures primarily meet the demands and needs of consumers according to geographic, market and specific regulatory frameworks (Reinartz, Wiegand, & Imschloss, 2019).

From this perspective, the main protagonists of this network of relationships and value generation are supermarkets (Reinartz, Wiegand, & Imschloss, 2019) as they constitute the most visible strategic link connecting production and consumption (Sparks, 2018). When the dimension of sustainability practices is emphasized, with emphasis on waste management, the aforementioned multiplicity and multidimensionality of supermarket activities become even more evident (Reinartz, Wiegand, & Imschloss, 2019).

Sustainability has established itself as a competitive imperative that goes beyond the simple positioning of companies in terms of social responsibility, as the isolated actions of retail supermarkets are perceived as insufficient

to face the socio-environmental crises and impacts (Singh, & Giacosa, 2019; Erez, 2019). In this sense, sustainable practices in retail are seen as a competitive differential that can be added to the continuous efforts for greater competitiveness (Widlitz, 2020).

Considering all this range of conditions, another hypothesis emerges for the study, by aligning market-oriented sustainability with waste management practices and the generation of value in the production chain:

*Hypothesis 3: H3 - Market orientation moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) market orientation will increase (decrease) strength of the relationship.*

Given the research hypotheses, which deal with management practices, environmental knowledge, market orientation and their impacts on value creation, Table 1 can be seen, which indicates a summary of the constructs related to the hypotheses of the study and its respective theoretical bases.

Table 1. Constructs and synthesis of hypotheses

| Constructs                                      | Hypotheses  | Theoretical basis  |
|---|---|--|
| Waste management practices and Value generation | H1- The more comprehensive and effective the waste management practices of retail supermarkets, the greater the generation of value.  | Mills e Elkington (1997); Mebratu (1998); Santillo e Johnston (2007); Dresner (2008); Bebbington e Unerman (2018); Mehta e Siddique (2018); Kumar, Manrai e Manrai (2017); Yanagi, Michels-Kim (2018); Van Zanten e Van Tulder (2018); Dost <i>et al.</i> (2019); Rodríguez-García, Guijarro-García e Carrilero-Castillo (2019); Erez (2019); Singh e Giacosa (2019); Vadakkepatt <i>et al.</i> (2020).  |
| Environmental knowledge and value generation    | H2 - The retailer's environmental knowledge moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) knowledge by the retailer will increase (decrease) the strength of relationship. | Abdul-Rashid <i>et al.</i> (2017); Geissdoerfer <i>et al.</i> (2017); Cruz e Ferreira (2018); Liu <i>et al.</i> (2018); Sparks (2018); Erez (2019); Singh e Giacosa (2019); Reinartz, Wiegand e Imschloss (2019); Widlitz (2020).  |
| Market orientation and value generation         | H3 - Market orientation moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) market orientation will increase (decrease) strength of the relationship.                            | Freeman (2010); Parmar <i>et al.</i> (2010); Harrison, Freeman e Abreu (2015); Hörisch, Schaltegeer e Windolph (2015); Miles (2015); Saraiva <i>et al.</i> (2016); Kumar, Manrai e Manrai (2017); Palombini, Cidade e Jacques (2017); Geuke, Groh e Muncke (2018); Goebel <i>et al.</i> (2018); Mehta e Siddique (2018); Papadas, Avllonitis e Carrigan (2018); Van Zanten e Van Tulder (2018); Dost <i>et al.</i> (2019); Chowdhury <i>et al.</i> (2020); Colvin, Witt e Lacey (2020); Khojastehpour e Shams (2020); Wondirad, Tolkach e King (2020). |

**Source:** Made by the authors.

Considering the hypotheses raised, waste management practices are independent variables that influence the generation of value (H1) and market orientation (H2) and environmental knowledge (H3) are moderating variables of waste management practices and value creation. Figure 1 presents the theoretical model composing the three research hypotheses presented.

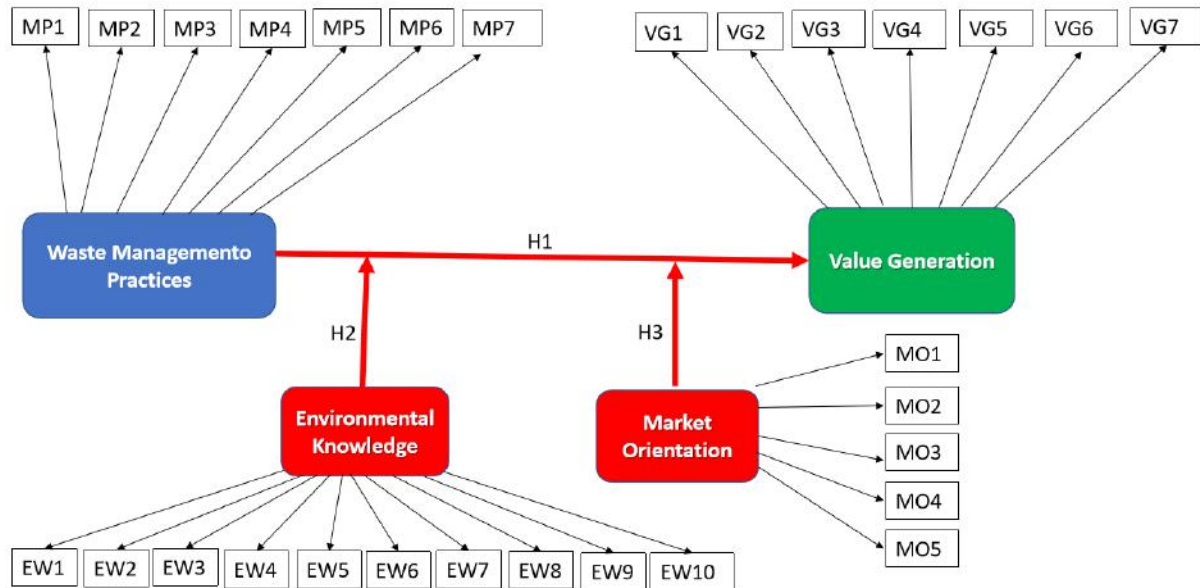


Fig.1. Proposed hypothesis model

### III. METHOD

The method used in the research was based on Structural Equation Modeling (SEM), adopting a survey in the research, a method that can be developed in different ways and using various instruments (Hair et al., 2009). In addition to the cross-section cut, structured face-to-face

questionnaires were applied to collect data on the research sample. In this sense, the questionnaire, based on the constructs and definitions in Table 2, was applied directly to respondents linked to two medium-sized retail chains in the Federal District. The sample is made up of owners, managers and strategic-level employees.

Table 2. Definition of research constructs

| Constructs                 | Item | Definition   |
|----------------------------|------|--|
| Waste Management practices | WP   | These are techniques applied in companies aiming to reduce the generation of waste and waste (DOST et al., 2019).  |
| Environmental Knowledge    | EW   | It is a strategic resource that needs to be shared managed in order to promote sustainable competitive advantages that pave the way for the creation, acquisition and transfer of knowledge (MADHI; NASSAR; ALMSAFIR, 2019).   |
| Market Orientation         | MO   | It refers to the downstream relationships of companies, in which the increase in concerns arising from multiple contemporary environmental crises contributes to the emergence of new forms of commercialization and consumption, causing companies to increase their adaptive and propositional capacities in order to continue operating in the market (KUMAR; MANRAI; MANRAI, 2017) |

|                  |    |  |
|------------------|----|--|
| Value Generation | VG | Cooperation between two or more organizations (companies and community) that promote learning, organizational knowledge, economic high, sustainability etc, leading to the generation of tangible and intangible values that strengthen and diversify partnerships (EIRIZ; GONÇALVES; AREIAS, 2017). |
|------------------|----|--|

**Source:** Made by the authors.

The research instrument was structured through a set of items, consisting of a 5-point Likert scale. To verify the constructs defined in Table 2, the scale ranged from 1 "totally disagree", "occasionally", "rarely", "never" and "not important" to 5 "totally agree", "very frequent", "very important" and "almost always true" (Gonçalves-Dias et al., 2009; Foxall; Hackett, 1992).

Before starting data collection for the study, a pre-test was carried out, which aims to identify possible flaws in the questionnaire, such as redundant or confusing questions, inconsistent or complex questions and questions with difficult language, according to Malhotra (2012). Even when applied to a small sample of respondents, pretesting can help eliminate potential problems.

In addition to the constructs, the questionnaire applied measured the sociodemographic aspects of the sample, such as: gender, age, education and professional experience. The access and awareness of actors to the terms of the research were improved by the approach made to the research instrument presented to retailers. The collection period took place between June and October 2021, resulting in 234 completed forms.

Taking into account the treatment of the data, Exploratory Factor Analysis (EFA) was used to reduce the number of variables and group them into constructs. In addition, the substitute variable criterion is adopted for each construct, being the variable with the highest factor loading, as it has the greatest explanatory power (Hair et al., 2009). In this way, an overview of the metrics related to the sustainability programs of the two researched food retail chains is constituted, highlighting the potential, challenges and limits placed on each one of them, in view of their unique trajectories and the specific conditions with which they face.

#### IV. ANALYSIS AND DISCUSSION OF RESULTS

##### 4.1 Data preparation

Preliminary data processing helps to identify what is not apparent, because in this type of analysis, hidden effects are easy to go unnoticed (Hair et al., 2009). Before moving

on to refine the data, such as Missing Datas and Outliers, some adjustments were made to the database.

The first step then was to download all data from the questionnaire respondents. For each respondent, an ID was created, an identification code that differentiates each respondent in the questionnaire. Then, some tabulations were made. As each construct was linked to a group of questions, and each question was given an identification code, thus creating a caption for the question.

In cleaning the data, we sought to identify univariate and multivariate outliers and missing data, resulting in the elimination of 7 forms. In addition to the elimination of questionnaires, the treatment was also carried out with the disregard of unanswered items. Data analysis was performed using SPSS® 0 software (Statistical Package for Social Sciences) (Version 24.0) for Windows® and AMOS® TM 18 software (Analysis of Moment Structures) coupled with SPSS®.

##### 4.2 Sample profile

After making these necessary adjustments, a multivariate assessment that calculates the Mahalanobis distance (D2) is used to identify outliers. According to Hair et al. (2009), when researchers need to objectively measure the multidimensional position of each observation in relation to a common point, the Mahalanobis metric (D2) can be used.

Therefore, two multivariate analyzes are performed: the first analyzes all measurement variables, thus creating the MAH\_1 variable. In the second analysis (MAH\_C) the degree of freedom of the regression is considered, according to the number of variables under study. According to Hair et al. (2009), for atypical observations of large samples, it is recommended to consider values greater than  $D2 / gl = 3$  or 4. Therefore, according to the Mahalanobis analyses, respondents with ID 6, 16, 145 and 165 were considered outliers.

After excluding outliers, the valid sample now has 227 respondents. The characterization questions (gender, age, education and experience in the company) were applied to obtain the general profile of the sample. According to respondents, from the total sample, 115 respondents were

men and 112 were women. The age range of most respondents was between 21 and 30 years old, as can be seen in Table 2.

*Tabela 2. Age group*

| AGE               |            |              |
|-------------------|------------|--------------|
| Description       | N          | %            |
| Under 20          | 8          | 3.5          |
| Between 21 and 30 | 141        | 62.1         |
| Between 31 and 40 | 52         | 22.9         |
| Between 41 and 50 | 22         | 9.7          |
| Over 50           | 2          | 0.9          |
| Notdeclared       | 2          | 0.9          |
| <b>TOTAL</b>      | <b>227</b> | <b>100.0</b> |

**Source:** Research data.

Another characterization issue was related to the level of education of the respondents in the sample. According to the responses, most respondents have completed high school, as seen in Table 3.

*Table 3. Degree of education*

| Degreeofeducation             |            |              |
|-------------------------------|------------|--------------|
| Description                   | N          | %            |
| ElementarySchool              | 23         | 10.1         |
| High School                   | 140        | 61.7         |
| Incomplete Superior Education | 33         | 14.5         |
| Complete Superior Education   | 25         | 11.0         |
| Notdeclared                   | 6          | 2.6          |
| <b>Total</b>                  | <b>227</b> | <b>100.0</b> |

**Source:** Research Data

The last question in the characterization questionnaire was related to the respondents' experience, that is, how long they had been working in the company. The answers can be seen in Table 4.

*Table 4. Experience in the company*

| EXPERIENCE         |            |              |
|--------------------|------------|--------------|
| Description        | N          | %            |
| 01 to 04 years     | 139        | 61.2         |
| 05 to 09 years     | 45         | 19.8         |
| 10 to 20 years     | 16         | 7.0          |
| More than 20 years | 12         | 5.3          |
| Notdeclared        | 15         | 6.6          |
| <b>Total</b>       | <b>227</b> | <b>100.0</b> |

**Source:** Research Data.

#### 4.3 Descriptive Analysis



Descriptive analysis is an activity that aims to present qualitative aspects of the research, and show the characteristics of the variables of each construct, in addition to showing how they behave in the study (Luppi, 2017).

Thus, the Waste Management Practices (MP) construct was measured through 8 questions focused on environmental management actions carried out within the

company. The questions were about agreement and frequency, and the answers ranged from “totally agree” to “totally disagree” and from “very often” to “never”. Through the analysis of this construct, Table 4 was developed containing the mean, median, standard deviation and the minimum (of 1) and maximum (of 5) for each question.

*Table 5. Descriptive analysis of the waste management practices construct*

| DESCRIPTIVE STATISTICS |      |        |                    |         |         |
|------------------------|------|--------|--------------------|---------|---------|
| Variable               | Mean | Median | Standard Deviation | Minimum | Maximum |
| MP1                    | 3.48 | 3.48   | 1.16               | 1.00    | 5.00    |
| MP2                    | 3.43 | 4.00   | 1.30               | 1.00    | 5.00    |
| MP3                    | 3.69 | 4.00   | 1.13               | 1.00    | 5.00    |
| MP4                    | 3.57 | 4.00   | 1.08               | 1.00    | 5.00    |
| MP5                    | 3.50 | 4.00   | 1.36               | 1.00    | 5.00    |
| MP6                    | 3.26 | 3.00   | 1.21               | 1.00    | 5.00    |
| MP7                    | 3.48 | 3.00   | 1.22               | 1.00    | 5.00    |

Source: Research data.

The next construct measured was Value Generation (VG), through questions 8 to 14. The questions were related to the company's search for ways to expand learning in the adoption of sustainability practices. The answers were related to agreement, frequency and veracity, ranging from “totally agree” and “totally disagree”, “very

often” to “never” and “almost always true” to “almost always false”. Through the analysis of this construct, Table 5 was developed containing the mean, median, standard deviation and the minimum (of 1) and maximum (of 5) for each question.

*Table 6. Descriptive analysis of the value generation construct*

| DESCRIPTIVE STATISTICS |      |        |                    |         |         |
|------------------------|------|--------|--------------------|---------|---------|
| Variable               | Mean | Median | Standard Deviation | Minimum | Maximum |
| VG1                    | 3.48 | 4.00   | 1.38               | 1.00    | 5.00    |
| VG2                    | 3.35 | 3.00   | 1.29               | 1.00    | 5.00    |
| VG3                    | 3.28 | 3.00   | 1.36               | 1.00    | 5.00    |
| VG4                    | 3.19 | 3.00   | 1.23               | 1.00    | 5.00    |
| VG5                    | 3.50 | 4.00   | 1.21               | 1.00    | 5.00    |
| VG6                    | 2.64 | 3.00   | 1.29               | 1.00    | 5.00    |
| VG7                    | 3.49 | 4.00   | 1.15               | 1.00    | 5.00    |

Source: Research data.

The next construct measured was Market Orientation (MO), through questions 15 to 19. The questions were focused on how the company behaved in the market and its actions. The answers were related to agreement and frequency, ranging from “totally agree” to “totally

disagree” and “very often” to “never”. Through the analysis of this construct, Table 6 was developed containing the mean, median, standard deviation and the minimum (of 1) and maximum (of 5) for each question.

Table 7. Descriptive analysis of the market orientation construct

| DESCRIPTIVE STATISTICS |      |        |                    |         |         |
|------------------------|------|--------|--------------------|---------|---------|
| Variable               | Mean | Median | Standard Deviation | Minimum | Maximum |
| MO1                    | 3.34 | 3.00   | 1.26               | 1.00    | 5.00    |
| MO2                    | 3.70 | 4.00   | 1.11               | 1.00    | 5.00    |
| MO3                    | 3.80 | 4.00   | 1.11               | 1.00    | 5.00    |
| MO4                    | 3.91 | 4.00   | 1.29               | 1.00    | 5.00    |
| MO5                    | 3.86 | 4.00   | 1.05               | 1.00    | 5.00    |

Source: Research data.

Another construct measured was Objective Environmental Knowledge, through questions 20 to 24. For each question of this construct there was only one correct answer, and these answers were transformed into a single variable, by summing the correct answers, considering zero for the wrong answers and one for the

correct answer. The respondent who did not have any right answers got a score of zero and the one who got all the questions in the construct right got a score of five. Through the analysis of this construct, Table 7 was developed containing the mean, median, standard deviation and the minimum (of 0) and maximum (of 5).

Table 8. Descriptive analysis of the objective environmental knowledge construct

| DESCRIPTIVE STATISTICS |      |        |                    |         |         |
|------------------------|------|--------|--------------------|---------|---------|
| Variable               | Mean | Median | Standard Deviation | Minimum | Maximum |
| OEK                    | 2.22 | 2.00   | 1.08               | 0.00    | 5.00    |

Source: Research data.

The next construct measured was the Sustainable Competitive Advantage (CA), through questions 25 to 29. The questions were focused on the company's concern with its social and environmental responsibilities. The answers were related to agreement and frequency, ranging

from “totally agree” to “totally disagree” and “very often” to “never”. Through the analysis of this construct, Table 8 was developed containing the mean, median, standard deviation and the minimum (of 1) and maximum (of 5) for each question.

Table 9. Descriptive analysis of the sustainable competitive advantage construct

| DESCRIPTIVE STATISTICS |      |        |                    |         |         |
|------------------------|------|--------|--------------------|---------|---------|
| Variable               | Mean | Median | Standard Deviation | Minimum | Maximum |
| CA1                    | 3.81 | 4.00   | 1.07               | 1.00    | 5.00    |
| CA2                    | 2.98 | 3.00   | 1.28               | 1.00    | 5.00    |
| CA3                    | 3.68 | 4.00   | 1.15               | 1.00    | 5.00    |
| CA4                    | 3.71 | 4.00   | 1.15               | 1.00    | 5.00    |
| CA5                    | 3.86 | 4.00   | 1.09               | 1.00    | 5.00    |

Source: Research data.

The last construct measured by the questionnaire was Subjective Environmental Knowledge, through questions 30 to 34. The questions were subjective, that is, the respondent made a self-assessment of his environmental knowledge, through agreement responses, ranging from

“agree totally” to “strongly disagree”. Through the analysis of this construct, Table 10 was developed, containing the mean, median, standard deviation and the minimum (of 1) and maximum (of 5) for each question.

Table 10. Descriptive analysis of the subjective environmental knowledge construct

| DESCRIPTIVE STATISTICS |      |        |                    |         |         |
|------------------------|------|--------|--------------------|---------|---------|
| Variable               | Mean | Median | Standard Deviation | Minimum | Maximum |
| SEK1                   | 3.44 | 3.00   | 1.16               | 1.00    | 5.00    |
| SEK2                   | 3.24 | 3.00   | 1.34               | 1.00    | 5.00    |
| SEK3                   | 2.46 | 2.00   | 1.39               | 1.00    | 5.00    |
| SEK4                   | 3.14 | 3.00   | 1.21               | 1.00    | 5.00    |
| SEK5                   | 3.94 | 4.00   | 1.08               | 1.00    | 5.00    |

Source: Research data.

#### 4.4 Measurement Properties

To study the model, three measures were used: Cronbach's Alpha, Composite Reliability and Discriminant Validity. Cronbach's Alpha is used to analyze simple reliability with values greater than 0.70. Composite reliability (CC) is used to check the internal consistency of the set of variables, reaching a value greater than 0.70. The extracted

variance (EV) is used to explain how the total variance of each variable is used to compose the construct evaluation, considering values above 0.50 (Hair et al., 2009). The number of respondents, except for outliers, was 227. Table 11 shows the values of the measures studied for each construct.

Table 11. Measures analyzed

| Construct                        | N | Cronbah Alpha | compositereliability | extractedvariance |
|----------------------------------|---|---------------|----------------------|-------------------|
| Waste management practice        | 7 | 0.751         | 0.762                | 0.324             |
| Value Generation                 | 7 | 0.831         | 0.842                | 0.459             |
| Subjectiveenvironmentalknowledge | 5 | 0.694         | 0.7                  | 0.324             |
| Market orientation               | 5 | 0.703         | 0.714                | 0.34              |

Source: Resarch data.

It is noticed that the variables PG2, GV5, GV6, CAS5 and OM1 had factor loadings below 0.60, and were excluded. After data purification, Table 12 was obtained.

Table 12. Measures after refinement

| Construct                        | N | Cronbah Alpha | compositereliability | extractedvariance |
|----------------------------------|---|---------------|----------------------|-------------------|
| Waste management practice        | 6 | 0.769         | 0.772                | 0.363             |
| Value Generation                 | 5 | 0.872         | 0.875                | 0.586             |
| Subjectiveenvironmentalknowledge | 4 | 0.691         | 0.696                | 0.365             |
| Market orientation               | 4 | 0.691         | 0.702                | 0.377             |

Source: Resarch data.

Therefore, it is observed that, after refining the data, Cronbach's Alpha increased in all cases, except for the Subjective Environmental Knowledge construct, which was at 0.694 and changed to 0.691. The Composite Reliability measure, after refinement, was higher for the Waste Management Practices and Value Generation constructs, and lower for the other two constructs. As for

the Extracted Variance, after refinement, it was higher for all analyzed constructs.

#### 4.5 Structural Model Test

The test of the structural model of this thesis was carried out using the moderator variables Market Orientation, Objective Environmental Knowledge and Subjective Environmental Knowledge, and the dependent variables Waste Management Practices and Value Generation. The

database with 227 respondents was considered, removing the outliers. Through the tests, Figure 2 presents the structural model, from the analysis of the results,

hypotheses and measures of the constructs, according to Hair et al., (2009).

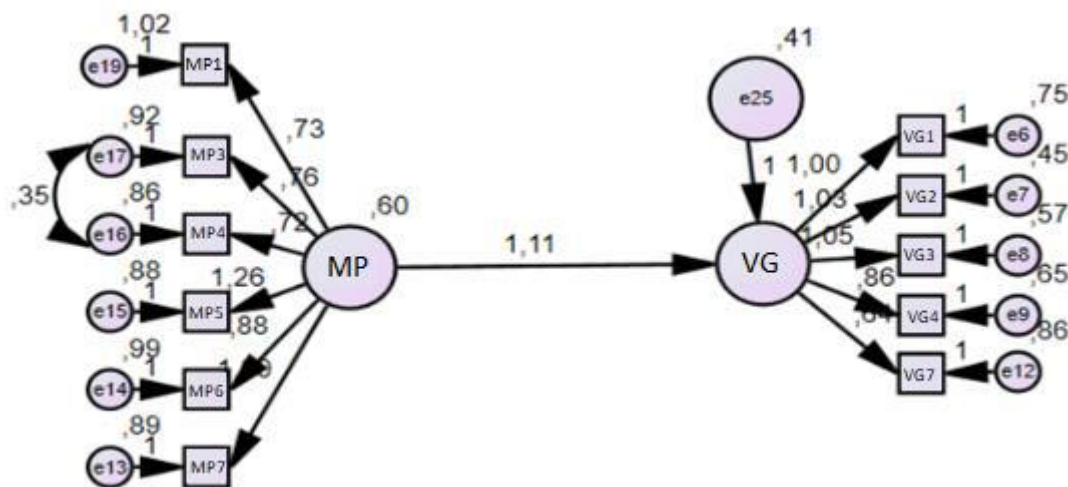


Fig.2.Structural model

Conforme as análises feitas, observa-se que a variável CAS (Conhecimento Ambiental Subjetivo) possui significância ( $p=0,022<0,05$ ) sobre as variáveis GV e PG, mostrando que este tem um efeito moderador. Assim como o CAS, o CAO (Conhecimento Ambiental Objetivo) também possui significância ( $p=0,001<0,05$ ), mostrando que esta variável independente tem efeito moderador sobre as variáveis PG e GV. Já a Orientação para o Mercado possui um valor de  $p>0,05$ , mostrando que esta variável não possui efeito moderador sobre as variáveis dependentes. Esta relação pode ser observada na Tabela 12.

According to the analyzes carried out, it is observed that the variable SEK (Subjective Environmental Knowledge) has significance ( $p=0.022<0.05$ ) on the VG and MP variables, showing that this has a moderating effect. Like the SEK, the OEK (Objective Environmental Knowledge) also has significance ( $p=0.001<0.05$ ), showing that this independent variable has a moderating effect on the MP and VG variables. Market Orientation, on the other hand, has a value of  $p>0.05$ , showing that this variable has no moderating effect on the dependent variables. This relationship can be seen in Table 13.

Table 13. Moderators' Relations

| Relations                                | $\beta$ (Alto) | $\beta$ (Baixo) | Sig.  |
|--|----------------|-----------------|-------|
| SEK (Subjective Environmental Knowledge) | 1.384***       | 0.550***        | 0.022 |
| OEK (Objective Environmental Knowledge)  | 0.920***       | 17.303          | 0.001 |
| MO (Market Orientation)                  | 0.705          | 0.909           | 0.604 |

Source: Resarch data.

Analyzing the hypotheses proposed by the research, it is observed that H1 shows that the more comprehensive and effective the waste management practices of retail supermarkets, the greater will be the generation of value, according to the significance tests applied.

H2 indicates that the retailer's environmental knowledge moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) knowledge by the retailer will increase (decrease) the

strength of the relationship, and this hypothesis is true according to the tested model.

H3 suggests that market orientation moderates the relationship between waste management practices and value generation in the production chain, in such a way that a higher (lower) market orientation will increase (decrease) strength of the relationship, however, by the tests made by this model, the relationship does not generate significance.

The chi-square index by degrees of freedom CMIN/DF (2.275), which is the index that compares the covariance matrix with the observed matrix, presented a

recommended value, which is less than 5. As can be seen in Table 13, all indexes were within the recommended parameters.

Table 14. Model fit indices

| Index   | Estimate | Parameter             |
|---------|----------|-----------------------|
| CMIN/DF | 2.275    | < 5.00                |
| GFI     | 0.928    | > 0.90                |
| NFI     | 0.910    | > 0.90                |
| IFI     | 0.948    | > 0.90                |
| TLI     | 0.931    | > 0.90                |
| CFI     | 0.947    | > 0.90                |
| RMSEA   | 0.075    | 0.050 < RMSEA < 0.080 |

Source: Research data.

According to Hair et al. (2009), the validation of the model starts with the results obtained through the fit indices. It was observed that the adjusted GFI quality indicators (0.928) and reached the theoretically recommended value which is greater than 0.90. The comparative adjustment index CFI (0.947) also reached an acceptable value in the literature, which is greater than 0.90, as well as the RMSEA index (0.075), which reached the value proposed in the literature, which is less than 0.08.

## V. CONCLUSION

This study aimed to analyze the relationship between waste management practices and the generation of value in medium-sized retail supermarkets (Reade, 2017; Reinartz, Wiegand, & Imschloss, 2019; Çankaya, & Sezen, 2018), supported by moderating variables environmental knowledge and market orientation defined in the proposed model of hypotheses (Figure 1).

The research question investigated is aimed at understanding the interrelationships between waste management practices in the generation of value and, consequently, in sustainability in the context of medium-sized retail supermarkets and their value chain. The applied methodology proved to be relevant to meet the proposed research objective, as well as in the investigation of the research problem, focusing on Structural Equation Modeling (SEM) and on the analysis of applied survey data, according to Hair et al. (2009).

The proposed model of hypotheses (Figure 1) for analyzing the relationships between the constructs is an important research contribution to the analysis of sustainability in the value chain, as it helps to identify waste management practices and their relationship with the

generation of value and sustainability of the value chain, as well as the influence of environmental knowledge and market orientation in the relationship between variables.

The positive correlations found between the constructs contained in the structural model (Figure 2) is an important managerial contribution for medium-sized supermarket retail chains, as they have managerial implications, in which the recommendation for the use of a set of strategic guiding (EW and MO), as a way to achieve strategic objectives (WP and VG) to obtain greater competitive advantage and, consequently, a better position in the value chain.

Based on the results of the structural model (Figure 2) and the hypothesis tests (Table 2), it is considered that the H1 hypotheses (the more comprehensive and effective the waste management practices of retail supermarkets, the greater the generation of value) and H3 (market orientation moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) market orientation will increase (decrease) the strength of the relationship) were confirmed.

However, hypothesis H2 (the retailer's environmental knowledge moderates the relationship between waste management practices and the generation of value in the production chain, in such a way that greater (lesser) knowledge by the retailer will increase (decrease) strength of the relation) was partially supported, being verified in the applied tests that only the subjective environmental knowledge moderates the relation between the variables, and the objective environmental knowledge did not present significance.



This research is limited to the study of two medium-sized retail supermarket chains from a homogeneous region, therefore, it is suggested comparative studies in different regions of Brazil and the inclusion of regional economic factors as moderators of the relationships between the constructs, as well as the survey and testing of new hypotheses that can bring theoretical and managerial contributions, contributing to studies on sustainability in the value chain of medium-sized retail supermarkets, a segment that is still little studied.

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